Historic, archived document

Do not assume content reflects current scientific knowledge, policies, or practices.

July 1960 ARS-33-59

A420
R31
Cop. 2

LIBRARY
AUG 2 5 1960
U. S. DEPARTMENT OF AGRICULTURE

UNITED STATES DEPARTMENT OF AGRICULTURE
Agricultural Research Service

THE SPECIFIC NAME OF THE POTATO APHID, AND A REDESCRIPTION OF THE LECTOTYPE OF MACROSIPHUM EUPHORBIAE (THOMAS)[1/]

By Louise M. Russell, Entomology Research Division

The widely distributed and economically important potato aphid has been known by numerous scientific names. Hille Ris Lambers (10, pp. 84-86) listed 25 specific names that he believed applied wholly or in part to this insect, and more recently two additional ones have been associated with the species. In the North American literature this aphid usually has been called Macrosiphum solanifolii (Ashmead), but in Europe it has gone by this and other names, Macrosiphum euphorbiae (Thomas) being the one used most frequently during the past 20 years. Workers in most parts of the world now treat solanifolii as a synonym of euphorbiae, but American entomologists have been reluctant to discard Ashmead's name because of its familiarity and extensive use, and because of the thought that the two names might actually represent different species. This paper presents evidence in support of the belief that euphorbiae is the correct specific name for the insect, and provides a redescription of the type material of the species.

Hottes and Frison (12, p. 306) indicated that solanifolii of authors was the same as euphorbiae Thomas (1878), which they mistook for gei Koch (13, pp. 171-172), but they did not synonymize solanifolii Ashmead (1882) with euphorbiae. Hille Ris Lambers (9, p. 1061; 10, pp. 83-89) used euphorbiae as the name for the potato aphid, treating solanifolii as a synonym of the older name. During the last decade several persons have discussed the scientific name of the insect, and the statements of these authors, except for those of Taylor (21) and Eastop (5) whose papers do not alter the picture, have been reviewed by Hille Ris Lambers and MacGillivray (11, pp. 322-324). These authors reaffirmed the opinion of Hille Ris Lambers and showed as conclusively as possible on the basis of the information available to them, that Macrosiphum euphorbiae (Thomas) is the valid name for the potato aphid. There is now additional evidence for this belief based on the study of type material of euphorbiae and euphorbicola Thomas (22). It is probable that the original description of solanifolii refers in part to the older species.

Ashmead (1, pp. 92-93) described solanifolii from Solanum jasminoides Paxt. from Florida; he did not give the exact location, but it may have been Jacksonville, where he resided. Neither did he give the date of collection, and though it might be assumed that it was during

---

1/ Homoptera, Aphidae.

the colder part of the year, since he described a "male," the time is uncertain because the so-called male undoubtedly was a winged aphid of a different species than the wingless female, as was stated by Patch (15, p. 251; 17, p. 215). Type specimens of solanifolii, if extant, should be in the collection of the United States National Museum, where many of Ashmead's types are located, but type specimens of the aphids, aleyrodids, and coccids described by him have not been found, and probably have been lost. His types apparently were not left in Florida, for A. N. Tissot has informed me that they are not in the collection of the University of Florida or of the Florida State Plant Board, at Gainesville, the only institutions in the State where they might have been deposited. Further, no aphids from S. jasminoides have been found in collections, or on plants now growing near Gainesville. Thus at the present time it is not possible to prove the identity of solanifolii from type or other authentic specimens, and precise ideas of the species cannot be deduced from its meager description. The present-day concept of the species has been derived largely from the insect as it is known on potato, from the association of this concept with the name of an insect described from a Solanum, and to a lesser extent by the fact that the potato insect can be accommodated within a part of the original description of solanifolii. Since Ashmead's description of the apterous female unmistakably refers to a different species than that of the "male," and since the description of the former is not, and the description of the latter is, at variance with the established concept of solanifolii, it is desirable to accept the description of the female as representative of the species. The concept of solanifolii was established early in this century by the Patch (15, pp. 251-257; 16, pp. 84-85; 17, pp. 208-210) descriptions of specimens collected in Maine. Though Patch (15, p. 251) expressed doubt that solanifolii was the oldest name for the species, she accepted the name used by Pergande, who identified certain Maine specimens for her. There is no evidence that Pergande ever saw type specimens of solanifolii.

Before describing solanifolii, Ashmead (1, pp. 65-67; 2, pp. 91-92) described insects under the name of Siphonophora citrifolii, from citrus in Florida. It is likely that most persons who have published on citrifolii have not compared the 1880 and 1882 papers, but Pergande (19, pp. 310-311), who obviously had done this, stated that Ashmead's 1880 citrifolii was Aphis gossypii Glover (8, p. 36), while his 1882 citrifolii was in part gossypii and in part a species apparently belonging to Rhopalosiphum. Essig (6, p. 596), referring to the latter, stated, "Although this may not be the insect which he [Ashmead] originally described under that name, he, nevertheless, describes it as a dimorphic form and his description of this is adequate to decide that the Macrosiphum found on citrus trees in this State [California] is the same as Siphonophora citrifolii described by Ashmead." Swain (20, pp. 69-70) synonymized citrifolii with solanifolii after studying specimens from citrus and other hosts, and transferring them experimentally. He was followed by Patch (18, p. 309). Hille Ris Lambers (10, p. 84) erroneously listed citrifolii 1880 as a synonym of euphorbiae, and did not mention citrifolii 1882.

From a study of the figures and the written description, it is clear that the insect Ashmead described as citrifolii in 1880 is not gossypii or solanifolii, but is Toxoptera aurantii (Fonscolombe) (7, pp. 178-179). (New synonymy.) The 1882 description of citrifolii is not an exact reproduction of the earlier description, but part of the wording is identical to that of 1880, and it is evident that one of the species under discussion is again aurantii, but it is possible that Aphis gossypii or some other species was confused with it. Part of the 1882 description is of what Ashmead thought was the dimorphic, viviparous female of the other insects he described. This "dimorph" is the Rhopalosiphum of Pergande and the citrifolii of Essig. Although the identity of Ashmead's so-called dimorph of citrifolii is not absolutely clear, it is as clear as that of his solanifolii, and it is possible that both names apply in part to a single species. Since the description of the "dimorph" of citrifolii precedes that of solanifolii, it has priority over the latter name, though with the identity of both species rather uncertain, the question of which has page precedence is of little consequence.

Three other names of species described from America, which are presumed to be synonymous with solanifolii, antedate the latter name by three years. Thomas (23, p. 58) described specimens from the leaves of Asclepias cornutii Deene, Fort Dodge, Iowa, September 1, under the name "Siphonophora asclepiadis? Fitch," but proposed the name "S. asclediadifolii" /sic/ for the species if it should be different from the Fitch species. He (23, p. 67) also described S. cucurbitae from the leaves of squash vines, Carbondale, Illinois, May. Davis (3, p. 327; 4, p. 109) indicated that Thomas probably had confused two species under the name asclepiadis, but did not apply asclepiadifolii to either of them. Hottes and Frison (12, p. 306), also without using the name asclepiadifolii, stated that asclepiadis of Davis (3) was, and cucurbitae probably was, the species they misidentified as gei (Koch). These authors (12, pp. 140, 306) also stated that type specimens of both these species had been lost and not recovered. The types of S. tulipae Monell (14, pp. 19-20), described from "petals and stigma of Tulips, April; Saint Louis, Mo.," have not been found with other Monell types at Purdue University, and doubtless have been lost. S. asclepiadifolii, cucurbitae, and tulipae were listed as synonyms of euphorbiae by Hille Ris Lambers (10, p. 84); it is likely that this entire synonymy, and indeed it is rather certain that that of the last two species, is correct. These names have seldom appeared in literature, and concepts of the species have not been established by redescriptions, as has that of solanifolii. Though not positively determinable from their descriptions, the identity of these species is as clear as is that of solanifolii from its original description, and being older, the names are available for the species unless priority is waived in favor of usage. This circumstance makes it evident that these names, as well as citrifolii 1882, and solanifolii, should be rejected, and euphorbiae accepted.

The identity of euphorbiae, in contrast to that of solanifolii and the other species discussed above, is rather clear. There is one type specimen of this species in the collection of the Illinois Natural History Survey, and I have been privileged to study it, as well as type specimens of euphorbicola, through the courtesy of H. H. Ross. The insects under the two names apparently represent a single species, even though Thomas (23, pp. 56-57) was quite confident, at the time they were discovered, that the two species were distinct. It is likely that the insects described under the two names were members of one collection, but were described as two species because of slight differences in appearance. Thomas (22) described the winged female of Siphonophora euphorbiae (p. 6), and the winged and wingless females of S. euphorbicola (pp. 6-7). He stated that both species were collected from Euphorbia maculata L., Sioux City, Iowa, 1877, but gave the collection date for euphorbiae as "September 1," and for euphorbicola as "about the 1st of September." Thomas' material was lost for years, but eventually was recovered by Hottes and Frison (12, pp. 140, 306), who mounted on slides the specimens that were found in dry vials, and labeled the slides from data associated with numbers accompanying the insects. The date on the slide labels of both euphorbiae and euphorbicola is August 31, 1877. Most examples of euphorbicola are similar to euphorbiae in that they are winged and contain fungus. I am in agreement with Davis (4, p. 108) and with Hottes and Frison (12, p. 306), who listed euphorbicola as a synonym of euphorbiae, after Williams (24, p. 78) had indicated the probable synonymy.

Though the insects are in unsatisfactory condition, the visible morphological characters of euphorbiae suggest, and those of euphorbicola indicate clearly, that this is the species commonly found on potato. It could be argued that, because a mass of literature has accumulated under the name of solanifolii in America, this name should be retained. This conclusion seems untenable, however, when one considers the certainty of the identity of euphorbiae and the uncertainty of the identity of solanifolii; that several older names than solanifolii are available for the species; that before 1939 the species was confused under several names; and that during the last two decades a considerable amount of literature has appeared outside, and a little within, America, under the name euphorbiae. In reality, there appears to be no legitimate reason for retaining solanifolii as the specific name of the potato aphid.

Since the type slides of euphorbiae and euphorbicola have been seen by few persons and the specimens described only by Thomas, it seems desirable to discuss the slides briefly, to redescribe the type of euphorbiae, and to record certain characteristics of the types of euphorbicola. The slide of euphorbiae bears the following labels attached by Hottes and Frison: One red label, "Cotype Siphonophora euphorbiae Thomas;" one white label, "Aphididae Acrythosiphon [sic] euphorbiae (Thomas) Euphorbia maculata Sioux City, Iowa Aug. 31, 1877 Det. F. C. Hottes, Ill. Nat. Hist. Sur.;" and one white label, "Aphiidae Macrosiphum gei (Koch) Sl. 8771 Det. Hottes and Frison Ill. Nat. Hist. Sur." Each of the two slides of euphorbicola is labeled similarly to euphorbiae except

that the red labels bear the name "euphorbicola," and "alate viviparous♀♀" appears on one of them; there is no insect name on the white labels with the collection data; and the white labels with the name "gei" are numbered 8772 and 8773, instead of 8771.

The one viviparous female of euphorbiae is in poor condition, the body being full of fungus, so that only small portions of the derm can be observed. The head and thorax are intact, but a transverse portion of the dorsal surface, probably comprising the first three abdominal segments, is gone, and the derm is torn just anterior to the cauda. The insect is mounted with the dorsal surface up. In this position the structures are present as follows: Right antennal segments I, II, III, IV, and left antennal segment I; right foreleg; right middle coxa on body, the remainder of the leg disjointed from the coxa and lying at the left of the body; right posterior coxa; all left legs except the fore distal tarsal segment; right forewing possibly with a small detached fragment lying well to the right of the body; right hindwing possibly entirely present but curved, folded, and lying underneath the body so that its entire extent is not determinable; left forewing present to a roughly diagonal line extending from distad of the stigma to distad of the confluence of the anal vein with the margin; left hindwing broken near distal end, and its costal margin folded underneath the rest of the wing; one cornicle present but broken off at the base and lying latero-caudad of the body; cauda, rostrum, intact. The portions of the appendages not mentioned are absent from the slide.

One slide (No. 8772) of euphorbicola has numerous fragments of the bodies and appendages of nymphs and adults, and the other (No. 8773) has the broken bodies and appendages of five nymphs of which four are parasitized, and five adults, of which one is parasitized. No one specimen is as complete as the type of euphorbiae, but from the pieces it is possible to observe certain characteristics that are not determinable in the type of euphorbiae, and to note some variation.

Considering the condition of the type specimens of euphorbiae and euphorbicola, it is not strange that Hottes and Frison did not designate lectotypes of them. Although I, perhaps unnecessarily, here designate the only specimen of euphorbiae as lectotype, I find it impossible to designate one of the fragments of euphorbicola as a lectotype, for it is necessary to examine several unassociated pieces to obtain an idea of an entire insect.

Macrosiphum euphorbiae (Thomas)

Description of lectotype. Color.--Yellowish except brownish as follows: Inner and outer margins of antennal segment I, all of III except base, all of IV; distal portion of femur, proximal and distal portions of tibia, all of tarsus; wing veins and stigma; distal half of cornicle.

Measurements in millimeters.--Body, to cauda, 2.80; width across eyes, 0.50. Forewing, to distal end of stigma, 3. Hindwing, at least 2. Antennal segments: I, on inner margin 0.16; II, 0.10; III, 0.84, greatest (basal) diameter 0.040, least (distal) 0.032; IV, 0.72, diameter 0.032. Legs: Coxa, apparently 0.18; trochanter, apparently 0.09; femora, fore 0.99, middle 0.92, hind 0.115; tibiae, fore and middle, each 0.170, hind 0.224; tarsi, 1st segment each leg 0.032, 2nd segment foreleg 0.122, middle and hindleg each 0.144. Cornicle, 0.80. Cauda, apparently 0.40. Distal rostral segment, 0.136. Setae: On antennal segment III, 0.028-0.032; on antennal segment IV, 0.020-0.024; on frontal tubercles 0.032; on vertex, near median process, apparently 0.032; dorsal on head, anterior (submedian) 0.044, middle (lateral) 0.036, posterior (inner lateral) 0.040, (outer lateral, perhaps broken) at least 0.024; submarginal prothoracic, 0.028; caudal, 0.072-0.104; on anal plate, 0.072-0.088; on 8th tergum, apparently 0.060; length of other abdominal setae not determinable.

Frontal tubercles smooth, moderately divergent. Antennal segment III with 18 sensoria in a single row extending almost the length of the segment, varying in size, not tuberculate. Prothorax apparently without marginal tubercles. Second tarsal segment strongly imbricated; imbrications without spinules. Cornicle with a narrow flange; reticulate on distal one-fifth, moderately imbricated from reticulations to midlength; faintly imbricated or transversely wrinkled on basal half. Cauda gradually tapered, rather slender; with 4 setae on each margin, located nearly equidistant apart and equidistant from each end, but farther from each end than from each other, and 1 (broken near base) on dorsal surface near the apex. Anal plate with 15 marginal setae. Number of setae on distal rostral segment, on genital plate, and on 8th tergum, not determinable. Presence or absence of abdominal marginal tubercles and sclerites not determinable.

The structures not observed in euphorbiae but apparent in euphorbicola, and variations in them, are as follows: Forewing, 3.25-3.50 mm. long. Antennal segment III with 13-21 (usually less than 19) sensoria. Setae: Numbering 8-10 on the cauda; 2-4 on anterior half, and 11-13 on margin of the genital plate; 8-10 plus the apical ones on the distal rostral segment; 5-7 on the 8th tergum. Setae on 2nd-7th terga 0.020-0.024, and on 2nd-5th sterna 0.028 mm. long; rarely measurable.

Summary

The specific name of the insect commonly known as the potato aphid is considered, and it is concluded that Macrosiphum euphorbiae (Thomas) is the scientific name that should be applied to this insect. The lectotype specimen of euphorbiae is redescribed.

Siphonophora asclepiadifolii Thomas, S. cucurbitae Thomas, S. euphorbicola Thomas, S. tulipae Monell, S. citrifolii Ashmead 1882 in part, and S. solanifolii Ashmead are treated as synonyms of euphorbiae. Siphonophora citrifolii Ashmead 1880 is synonymized with Toxoptera aurantii (Fonscolombe). (New synonymy.)

Literature Cited

(1) Ashmead, William H.
1880. Orange insects; a treatise on the injurious and beneficial insects found on the orange trees of Florida. 78 pp., illus. Jacksonville, Fla.

(2) _____
1882. On the Aphididae of Florida, with descriptions of new species. Canad. Ent. 14: 88-93.

(3) Davis, John J.
1911. List of the Aphididae of Illinois, with notes on some of the species. Jour. Econ. Ent. 4: 325-331, illus.

(4) _____
1913. The Cyrus Thomas collection of Aphididae, and a tabulation of species mentioned and described in his publications. Ill. State Lab. Nat. Hist. Bul. 10: [97]-121, illus.

(5) Eastop, V. F.
1958. The history of Macrosiphum euphorbiae (Thomas) in Europe. Entomologist 91: 198-201.

(6) Essig, E. O.
1911. Aphididae of southern California. VIII. Pomona Col. Jour. Ent. 3: [586]-603, illus.

(7) Fonscolombe, Boyer de
1841. Description des pucerons que se trouvent aux environs d'Aix. Soc. Ent. de France Ann. 10: 157-198

(8) Glover, Townend
1877. Homoptera. Report of Commissioner of Agriculture of Operations of Department for Year 1876, pp. 24-46, illus.

(9) Hille Ris Lambers, D.
1938. Bladluizen en virustransport. Landbouwk. Tijdschr. 50: 1057-1062.

(10) _____
1939. Contributions to a monograph of the Aphididae of Europe. Temminckia 4: 1-134, illus.

(11) _____ and MacGillivray, M. E.
1959. Scientific names of potato-infesting aphids. Canad. Ent. 91: 321-328.

(12) Hottes, Frederick C., and Frison, Theodore H.
1931. The plant lice, or Aphiidae, of Illinois. Ill. Nat. Hist. Survey Bul. 19: 121-447, illus.

(13) Koch, C. L.
1855. Die Pflanzenläuse Aphiden. Nürnberg. 6: 167-196, illus.

(14) Monell, J.
1879. Notes on Aphidinae, with descriptions on new species. U. S. Geol. and Geog. Survey Bul. 5: 18-32.

(15) Patch, Edith M.
1907. The potato plant louse. Nectarophora solanifolii Ashmead. Maine Agr. Expt. Sta. Bul. 147: [235]-257, illus.

(16) _____
1911. Macrosiphum destructor and Macrosiphum solanifolii. Maine Agr. Expt. Sta. Bul. 190: [82]-92, illus.

(17) _____
1915. Pink and green aphid of potato (Macrosiphum solanifolii Ashmead). Maine Agr. Expt. Sta. Bul. 242: [205]-223, illus.

(18) _____
1923. Family Aphididae in The Hemiptera or sucking insects of Connecticut. Conn. State Geol. and Nat. Hist. Survey Bul. 34: 250-335, illus.

(19) Pergande, Theodor
1895. The cotton or melon plant-louse. (Aphis gossypii Glover.) U. S. Dept. Agr., Insect Life 7: 309-315.

(20) Swain, Albert F.
1919. A synopsis of the Aphididae of California. Calif. Univ. Tech. Bul. 3, 221 pp., illus.

(21) Taylor, C. E.
1958. Nomenclature of the common potato aphids (Hem., Aphididae). Ent. Monthly Mag. 94 (ser. 4): 169-170.

(22) Thomas, Cyrus
1878. A list of the species of the tribe Aphidini, family Aphidae, found in the United States, which have been heretofore named, with descriptions of some new species. Ill. State Lab. Nat. Hist. Bul. 2: [3]-16.

(23) _____
1879. Eighth report of the State entomologist on the noxious and beneficial insects of the State of Illinois. 212 + X pp., illus.

(24) Williams, Thomas Albert
1911. The Aphididae of Nebraska. Nebr. Univ. Studies (1910) 10: 85-175 ([1]-91).